

Memorandum

Date: November 5, 1997

To: Drinking Water Program
Regional and District Engineers

From: Division of Drinking Water and
Environmental Management
601 North 7th Street, MS 216
322-2308

Subject: Policy Memo 97-005 Policy Guidance for Direct Domestic Use of Extremely Impaired Sources

A. General Philosophy

The primary goal of the Drinking Water Program (DWP) is to assure that all Californians are, to the extent possible, provided a reliable supply of safe drinking water. In furtherance of this goal, the DWP continues to subscribe to the basic principle that only the best quality sources of water reasonably available to a water utility should be used for drinking. When feasible choices are available, the sources presenting the least risk to public health should be utilized. Furthermore, these sources should be protected against contamination. Whenever possible, lower quality source waters should be used for nonconsumptive uses, such as irrigation, recreation, or industrial uses, which pose lower health risks.

The use of contaminated water as a drinking water source always poses a greater health risk and hazard to the public than the use of an uncontaminated source because of the chance that the necessary treatment may fail.

The use of an extremely impaired source should not be approved unless the additional health risk, relative to the use of other available drinking water sources, are known, minimized, and considered acceptable.

Water utilities (including wholesalers) should be encouraged to minimize the concentration of man-made toxic substances, naturally occurring contaminants, and pathogenic microorganisms in drinking water supplies, maximum contaminant levels (MCLs) notwithstanding.

Extremely impaired sources that contain or are likely to contain high concentrations of contaminants, multiple contaminants, or unknown contaminants (such as groundwater subject to contamination from a hazardous waste disposal site) should not be considered for direct human consumption where alternatives are available.

Where reasonable alternatives are available, high quality drinking water should not be allowed to be degraded by the planned addition of contaminants. In other words, the MCLs should not be used to condone contamination up to those levels where the addition of those contaminants can be reasonably avoided.

Drinking water quality and public health shall be given greater consideration than costs or cost savings when evaluating alternative drinking water sources or treatment processes.

The DWP recognizes that there are extremely impaired sources in California that need to be cleaned up and for which the resulting product water represents a significant resource that should not be wasted. In some situations, it may be reasonable to consider the use of these treated extremely impaired sources for domestic use. Some communities may not have any choice. In such cases, the public health principles as set forth in this policy should be used to guide the evaluation of such situations.

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B. Purpose of Policy Guidance

The purpose of this guidance document is to set forth the position and the basic tenets by which DWP would evaluate proposals, establish appropriate permit conditions, and approve the use of an extremely impaired source for any direct potable use.

An extremely impaired source meets one or more of the following criteria:

- exceeds 10 times an MCL or action level (AL) based on chronic health effects,
- exceeds 3 times an MCL or AL based on acute health effects,
- is a surface water that requires more than 4 log *Giardia*/5 log virus reduction,
- is extremely threatened with contamination due to proximity to known contaminating activities
- contains a mixture of contaminants of health concern
- is designed to intercept known contaminants of health concern.

Examples include:

- Extremely contaminated ground water
- Effluent dominated surface water
- Oilfield produced water
- Water that is predominantly recycled water; urban storm drainage; treated or untreated wastewater; or agricultural return water
- Products of toxic site cleanup programs

It is recognized that the circumstances surrounding each situation may be different. Proposals for the use of extremely impaired sources, therefore, must be considered on a case-by-case basis.

C. Elements of an Evaluation Process for an Extremely Impaired Drinking Water Source

1. Source Water Assessment:

The purpose of the source water assessment for the extremely impaired source is to determine the extent to which the aquifer or surface water is vulnerable to contaminating activities in the area. There may be other contaminants associated with activities that contribute to the known contamination, or other contamination sources that have yet to impact the drinking water source. There may not be drinking water MCLs, ALs or monitoring requirements established for these additional contaminants, but health related information may be available through other programs. The appropriate level of monitoring and treatment to produce a safe drinking water cannot be determined unless the activities that are affecting or may impact raw water quality are understood. The assessment should include:

- Delineation of the source water capture zone
- Identification of contaminant sources
 - ◆ Identify the origin of known contaminants found in the source water and predict contaminant level trends
 - ◆ Identify chemicals or contaminants used at or generated by facilities responsible for the known contamination
 - ◆ Identify all potential contaminant sources and determine the vulnerability of the water source to these contaminant sources

2. Full characterization of the raw water quality:

The appropriate level of monitoring and treatment to produce a safe drinking water cannot be determined unless the raw water quality is fully understood. The following categories should be considered to fully characterize the source water quality:

- Title 22 drinking water regulated and unregulated chemicals
- All chemicals for which drinking water action levels are established
- All chemicals listed pursuant to Safe Drinking Water and Toxic Enforcement Act of 1986
- Microbiological quality
- Priority pollutants
- Gross contaminant measures [total organic carbon (TOC), etc.]
- Any compounds identified under source water assessment.
- Determine variability of contaminant concentrations with time (seasonal and long term)
- Determine variability of contaminant concentrations with pumping rate
- The detection of any contaminant identified in the raw water quality characterization (step 2) should require assessment of the impact on the source water pursuant to the source water assessment (step 1).

3. Source Protection:

There must be a program in place to control the level of contamination. At a minimum, best management practices for waste handling and waste reduction should be required. In addition, monitoring at the source should be conducted to determine the level of contamination and to reasonably assure that the contamination level will not increase. Unless the level of contamination is known a determination cannot be made that the proposed treatment is sufficiently adequate and reliable to render the water potable.

If the use of an extremely impaired source is to be approved, the source of the contamination must be controlled to:

- Prevent the level of contamination from rising.
- Minimize the dependence on treatment.

4. Effective Monitoring and Treatment:

The treatment process used to treat the extremely impaired source prior to direct usage in a domestic water distribution system must be commensurate with the degree of risk associated with the contaminants present. As a minimum, treatment for extremely impaired sources shall include use of the best available treatment technology defined for the contaminant(s) by the Environmental Protection Agency. Furthermore, the treatment processes must have reliability features consistent with the type and degree of contamination.

All treatment processes used must be optimized to reliably produce water that contains the lowest concentration of contaminants feasible at all times. The entire flow from the extremely impaired source must pass through the complete treatment process or processes. Any water from other sources that is available for blending prior to entry into the distribution system should be used to provide an additional safety factor.

Multi-barrier treatment is a set of independent treatment processes placed in series, and designed and operated to reduce the levels of a contaminant. Each barrier should effectively reduce the contaminant by a significant fraction of the total required reduction. The treatment processes should address all the contaminants of public health concern in an extremely impaired source. Multi-barrier treatment may be appropriate when:

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- The primary treatment is not sufficiently reliable;
- The primary treatment is of uncertain effectiveness;
- There is no direct way to measure the contaminant(e.g., pathogenic microorganisms);
- The health effect of the contaminant is acute; and/or
- Very large reductions in contaminant concentration are required.

The description of the proposed monitoring and treatment should include the following:

- Performance standards (field measurable indicator of treatment efficiency);
 - ◆ Identify level to assure compliance with the treatment objective
 - ◆ the treatment objective for all contaminants should be optimized to the lowest extent feasible and must assure compliance with the MCL/AL at all times
 - ◆ Facilities for treating water containing specific contaminants for which the MCL is higher than the maximum contaminant level goal (MCLG) should be designed and operated to meet the MCLG where this can be accomplished in a cost effective manner.
- Operations plan that identifies all operational procedures, failure response triggers, and loading rates, including:
 - ◆ Process monitoring plan
 - ◆ Process optimization procedures
 - ◆ Established water quality objectives or goals
 - ◆ Level of operator qualification
- Reliability features
 - ◆ Response Plan for failure to meet the treatment objective
 - ◆ Alternative disposal methods
 - ◆ Shutdown triggers and restart procedures
- Compliance monitoring and reporting program
- Notification plan
- Extremely impaired source water quality surveillance plan

The water quality surveillance plan should include monitoring between the origin of the contamination and the extremely impaired source that is proposed for drinking water.

5. Human Health Risks Associated with Failure of Proposed Treatment:

Treatment technologies are not failure proof, and insufficiently treated or untreated water may, on occasion, pass through the treatment process and into the distribution system. An assessment must be performed that includes:

- An evaluation of the risks of failure of the proposed treatment system

The proposed treatment system must be evaluated in terms of its probability to fail, thereby exposing customers to insufficiently treated or untreated drinking water from the extremely

All treatment failure modes are to be evaluated. The evaluation must include an assessment of the proposed frequency of monitoring as it relates to protection of the public from insufficiently treated or untreated drinking water.

- An assessment of potential health risks associated with failure of the proposed treatment system. The health assessment must take into account:
 - ◆ the duration of exposure to contaminated drinking water that would result from such a failure
 - ◆ the human health risks associated with such exposure to insufficiently treated or untreated water over the course of that failure, considering the risks of disease from microbiological organisms, and the risks of acute and chronic effects (including cancer risks) from chemical contaminants
 - ◆ potential cumulative risks, due to multiple failures

When risks of adverse health effects from treatment failure are not acceptable, then additional treatment safeguards must be used for the protection of public health, or the proposal must be rejected.

6. Identification of alternatives to the use of the extremely impaired source and compare the potential health risk associated with these to the project's potential health risk.

Use of alternative sources of drinking water reasonably available to a water utility should be evaluated as to health risk (assuming MCLs are, or can be, met), and compared to the use of the extremely impaired source.

In evaluating the relative risk comparison of the extremely impaired source and alternative drinking water sources, additive effects of multiple contaminants are an important consideration. Generally, consideration of allowing direct potable use of an extremely impaired source should be limited to a single toxic contaminant or a limited number of similar chemicals that can be reliably treated with the same process.

The comparison of alternatives should include a comparison of the risks of treatment failure for the alternatives, as well as for the extremely impaired source (step 5).

7. Completion of the California Environmental Quality Act (CEQA) review of the project:

CEQA review of the project must be completed.

8. Submittal of a permit application:

The public water system(s) collecting, treating and distributing water from the extremely impaired source must submit a permit application for the use of the extremely impaired source that includes the items identified above. A supplier of treated water to a public water system is a water wholesaler and must be permitted as a public water system, as required by the Safe Drinking Water Act.

9. Public hearing:

A public hearing must be held to identify concerns of consumers who will be served water from the

10. DHS evaluation:

DHS staff shall conduct an evaluation of the application and make recommendations.

11. Requirements for DHS approval:

The following findings are required of DHS for approval to use an extremely impaired source:

- Drinking water MCLs and ALs will not be exceeded if the permit is complied with, and
- The potential for human health risk is minimized, and the risk associated with the project is less than or equal to the alternatives.

12. Issuance or denial of permit:

DHS either issues a permit or denies a permit for the use of the extremely impaired source. If a permit is issued, it shall include all necessary treatment, compliance monitoring, operational, and reporting requirements.

A handwritten signature in cursive script, reading "David P. Spath".

David P. Spath, Ph.D., P.E., Chief